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Measuring the quality of e-banking portals

The quality of
e-banking
portals

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153

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Abstract

Purpose – In the internet economy, the business model of web portals has spread rapidly over the last few years. Despite this, there have been very few scholarly investigations into the services and characteristics that transform a web site into a portal as well as into the dimensions that determine the customer's evaluation of the portal's service quality.

Design/methodology/approach – Based on an empirical study in the field of e-banking, the authors validate a measurement model for the construct of web portal quality based on the following dimensions: security and trust, basic services quality, cross-buying services quality, added value, transaction support and responsiveness.

Findings – The identified dimensions can reasonably be classified into three service categories: core services, additional services, and problem-solving services.

Originality/value – The knowledge of these dimensions as major determinants of consumer's quality perception in the internet provides banks a promising starting point for establishing an effective quality management for their e-businesses.

Keywords Banking, Electronic commerce, Service delivery, Service quality assurance

Paper type Research paper

Introduction

Given the fact that banks invest billions in the internet infrastructure (Deutsche Bank invests approximately half a billion US\$ per year), customer satisfaction and customer retention are increasingly developing into key success factors in e-banking. Most importantly, profitable e-banking requires a strong focus not only on the acquisition of new customers but also on the retention of existing customers, since the acquisition costs in online banking exceed that of traditional off line business by 20-40 per cent (Reibstein, 2002; Reichheld and Scheffer, 2000). Consequently, establishing long-term customer relationships is a prerequisite for generating positive customer value on the internet.

During the last few years, these findings have led to the development of simple banking web sites into comprehensive e-banking portals offering a great variety of services in addition to traditional bank products and thereby enabling customers to gain financial advice from merely one source. Thus, the user ideally no longer needs to make use of several different web sites. The great variety of portal resources available also creates incentives for longer site visits (stickiness) during each use. Offering a broad range of financial services and features at one single site has been noted as the most important development in e-banking (Jun and Cai, 2001; Strieter *et al.*, 1999).

Meanwhile, several market shakeouts of e-banking portals have occurred in the course of the "massacre" of dot.com firms (Mahajan *et al.*, 2002). One example for such a dot.com failure is the Irish internet-only bank "first e" that filed for bankruptcy at the end of 2001 with the customers being unable to access their money for days.



According to Jun and Cai (2001), most internet banks are still lagging behind their customers' quality expectations. In order to enhance customer loyalty, portals are required to put a strong emphasis on their customers' quality demands, which are steadily increasing over time due to the growing competition in the internet banking industry (Jun and Cai, 2001). Most importantly, loyalty has been recognized as a key path to long-term profitability. These findings hold especially true for the financial service sector, where reducing the defection rate by 5 per cent can boost profits by up to 80 per cent (Reichheld and Sasser, 1990).

As far as retail banks are concerned, the introduction of e-commerce has brought a dramatic change in the way relationships with customers are built and maintained. In banking, which has traditionally been a high contact service, the lack of direct human interaction in online channels entails the use of each service element as an opportunity to reinforce or establish quality perceptions for customers (Broderick and Vachirapornpuk, 2002).

Additionally, service quality is a key determinant in differentiating service offers and building competitive advantages, since the costs of comparing alternatives are relatively low in online environments (Grönroos *et al.*, 2000; Santos, 2003). In view of these developments, service quality is a crucial issue in e-banking.

Despite these findings as well as the fact that quality evidently determines the decision whether to use and remain loyal to an online service provider (Reibstein, 2002; Shankar *et al.*, 2003), few academic efforts have been devoted to the identification of the criteria used by customers to assess a web portal's quality (Gounaris and Dimitriadis, 2003). In view of this, we formulate two main research objectives for our paper. First, we intend to develop a clear definition of the services and characteristics that actually transform a simple web site into an extensive e-banking portal. Taking this definition as a starting point, we analyze the different facets of the quality of services delivered through e-banking portals in order to process a concrete measurement model.

Our study is structured as follows: starting from an examination of the characteristics of online portals in general, we establish a definition of the term "web portal". After having discussed the current state of knowledge with respect to the conceptualization of electronic service quality in general and service quality in e-banking in particular, we develop our service quality model. Next, we present our research design for the empirical study and analyze its findings. Finally, we conclude our paper with a summary of the results and some implications for future research.

The portal business model in e-business

Portals are the so-called hybrid or integrative business models that do not solely follow any of the four net business models of content, context, communication and commerce, but integrate these "4 Cs of the internet" into a comprehensive business model (Afuah and Tucci, 2001; Bauer and Hammerschmidt, 2002). Portals can be characterized as integral problem solvers following an augmented service concept (Gounaris and Dimitriadis, 2003; Payne and Holt, 2001). In contrast to the so-called "pure play web sites" or "simple web sites", respectively, which are specialized in one of the four C-business models and emerge, for example, as information-only sites or transaction-only sites, portals can be described as "extensive web sites" (Huizingh, 2002).

Accordingly, several authors describe portals as innovative self-service technologies that offer a single point of access to services, an almost unlimited

content as well as applications and excellent retrieval facilities that enable “one-stop shopping” (Gounaris and Dimitriadis, 2003; Jun and Cai, 2001; van Riel *et al.*, 2001). In the context of e-banking portals, this means that all stages of the financial transaction cycle (information provision, initiation, negotiation, execution/settlement, after sales support) can be processed electronically. This is achieved by replacing personal interaction and physical facilities with technological solutions. As a consequence, customers are able to carry out different financial transactions at one site including paying their bills, viewing their bank statements, and purchasing stocks and other financial products (e.g. insurance). Thus, e-banking portals transfer the “all in one” principle from the old economy – where it is implemented through brick-and-mortar branches – to the internet (Bauer and Hammerschmidt, 2002; Jun and Cai, 2001).

In addition to the above-mentioned integration principle, there is a second portal characteristic often associated with the idea of one-stop banking, namely the inclusion of services from third parties (aggregation). This concept requires portal providers to invest into strategic alliances in order to increase transaction efficiency and benefits for customers through a broader range of offerings. Increasing the number of available alternatives at one single site can significantly reduce opportunity costs as well as costs of inconvenience due to virtual store hopping (Bergen *et al.*, 1996; Srinivasan *et al.*, 2002).

The third characteristic that transforms a conventional web site into a portal can be seen in the ability to personalize the above-mentioned portal services and functions, which means that the user can arrange the 4 Cs individually according to his or her own needs. Hence, personalization enables the user to create a “personal virtual bank” and in turn increases the user’s perceived control of portal processes and elements as well as the freedom of choice (Hoffman and Novak, 1996). Most notably, the customer can narrow down the number of alternatives and is therefore, able to reduce the time and costs of finding appropriate offers.

In conclusion, portal sites capture distinctive user segments by providing a broad range of customized facilitating and supporting services that add value to the core products. Thus, portals offer many advantages as compared to simple web sites and are by this means expected to positively affect satisfaction and loyalty of e-customers. Ideally, these advantages result in the fact that a portal is not only the first stop on the web surfer’s journey but also the only source a web surfer needs. Considering the portal’s all-in-one solution, the user no longer faces transaction costs (e.g. fees, time, risk and stress) that would result from the search for several specialized sites. The fact that users do not have to leave the portal site offers a high convenience benefit.

Conceptualizing service quality dimensions of e-banking portals

After having briefly discussed the general portal concept, we now examine the fundamental quality demands of customers in evaluating e-banking portals. For off-line environments it is common knowledge that quality of services and products is a key determinant of customer satisfaction and customer loyalty (Caruana, 2002; Cronin and Taylor, 1992; Kelley and Davis, 1994; Parasuraman *et al.*, 1988). Recent empirical evidence shows that, meanwhile, this holds true also for electronic service providers. The quality of services delivered through a web site has become a more significant

success factor than low prices or being the first mover in the market space (Mahajan *et al.*, 2002; Reibstein, 2002; Shankar *et al.*, 2003).

The most important step in providing a sophisticated level of service through e-banking portals is to identify and measure the dimensions of portal quality. This is the basic prerequisite for an effective quality management. Thereby, a portal's market success greatly depends on a customer-oriented definition of quality. What really determines an e-banking portal's quality is the customers' expectations and demands rather than objective or technical characteristics (Zeithaml *et al.*, 2002). Therefore, in the following, we develop a model for assessing quality from the user's perspective.

Literature review on general service quality dimensions

So far, despite their vital importance for the development of the internet, research on consumer evaluation of self-service technologies such as web portals has been limited (Gounaris and Dimitriadis, 2003). As a result, increasing attention is being paid to the differences between the assessments of service offerings on the internet as compared to the physical marketplace. Parasuraman and Grewal (2000) emphasize the fact that past conceptualizations of service quality created to evaluate traditional services and characterized by personal interaction between customer and employees cannot be adequately applied to virtual environments, where customers interact with technology rather than with service personnel. This holds true for traditional service quality models, e.g. SERVQUAL (scale and existing research on web site quality; Parasuraman *et al.*, 1988). Most of the dimensions and items of previous service quality models are developed to capture the nature of interpersonal service encounters (Cox and Dale, 2001). They assume human interactions throughout the entire transaction process, an aspect that is irrelevant for interactions between customers and online information systems. Here, the quality of the web site (portal) as the technical interface is of vital importance.

Several authors (Meuter *et al.*, 2000; Parasuraman and Grewal, 2000; Santos, 2003; van Riel *et al.*, 2001) propose to discard quality scales that are based on specific service encounter characteristics and instead suggest using general categorizations of services as a framework for developing new quality models for internet-based services. Following this proposition, we draw on existing approaches, which employ global definitions of service quality. Some of the propositions put forward in these studies are outlined in the following.

Kano's (1984) method for measuring customer-defined quality and suggests three fundamental quality demands relevant to quality evaluation: basic demands, performance demands and enthusiasm demands (Kano, 1984). These demands are fulfilled by three types of performance elements. Basic performances are regarded as obligatory (must-be services) and are therefore, not explicitly voiced. Spoken attributes are typically voiced, while surprise attributes are again rarely voiced (as they are unexpected) and can therefore, achieve high levels of satisfaction in sense of excitement.

The service model by Berry (1987) and the penalty-reward-approach by Brandt (1988) follow a similar logic but suggest two generic categories of service elements: minimum elements or routine services include all factors and processes that entail demerits if the provider fails to fulfill customer requirements. Value-enhancing services or non-routine-services encompass all elements that exceed customer expectations and are rewarded with bonus points.

In extending the two-dimensional functional/technical quality approach by Grönroos (1990) and Grönroos *et al.* (2000) propose an e-service concept consisting of core services, facilitating services and supporting services. Since it is often difficult to differentiate between facilitating and supporting services, van Riel *et al.* (2001) employ the term supplementary services in a more general way to denote services that are not part of but closely connected with core services. As a third category of services offered through a web site, van Riel *et al.* (2001) introduce complementary services that are neither facilitating nor supporting the core service. Thus, whereas supplementary services add value to the core service and are used to differentiate it from similar competing offerings, complementary services have the potential to add value to a portal in its entirety.

Similarly, Zeithaml *et al.* (2002) differentiate between core services and recovery services. The core service scale measures the service quality of online firms as perceived by the customer and is composed of four out of seven dimensions: efficiency, fulfilment, reliability, and privacy. These dimensions contain criteria customers draw on in order to assess the quality of a service in case no questions or problems arise. The recovery service scale falls into the three remaining dimensions of responsiveness, compensation and contact, which come into effect when customers run into problems or have questions. Responsiveness encompasses the e-service provider's ability to provide appropriate information in order to prevent further inconvenience and to be able to offer online warranties. Compensation includes "money back" and the refund of delivery costs, while contact refers to the provision of direct contact to a service agent via telephone or online.

The propositions outlined so far are consistent with empirical evidence, showing that the perceived quality of complex services is not reflected by a single quality rating of customers (Cox and Dale, 2001; Meuter *et al.*, 2000; van Riel *et al.*, 2001). Instead, a service consists of different partial performances (service components). The quality of each sub-process is evaluated separately by the customer while visiting a web site (Santos, 2003; Zeithaml *et al.*, 2002).

The concepts discussed to this point refer to this distinction of general service categories related to the users' quality judgment. Thus, they seem to be an appropriate basis for exploring the fundamental quality dimensions of e-banking portals.

Literature review on service quality in e-banking

As a consequence of the increasing importance of modern information and communication technologies for the delivery of financial services the analysis of e-banking quality issues becomes an area of growing interest to researchers and managers (Hughes, 2003; Jayawardhena, 2004). Virtually all studies dealing with the quality of electronic financial services focus on specific aspects of the quality evaluation. To our knowledge, the study presented by Gounaris and Dimitriadis (2003) is the first attempt to investigate the service quality of e-banking portals. Based on the SERVQUAL, the authors identify three quality dimensions, namely customer care and risk reduction benefit, information benefit and interaction facilitation. These dimensions are represented by only 14 items, a fact that has to be criticized. These indicators do not fully cover all relevant facets regarding the business activities of an e-banking portal, which contradicts the idea of portals as holistic business models. For example, aspects like offering a broad spectrum of complementary products and services or the reliability of service delivery are not included.

The following studies are focussed on specific service delivery aspects of conventional, simple banking web sites and therefore consider particular service quality dimensions. Broderick and Vachirapornpuk (2002) and Jun and Cai (2001) employ qualitative techniques. By using the critical incident technique, Jun and Cai (2001) identify 532 critical incidents in online banking, which are grouped into three central quality categories namely that of customer service quality, online systems quality, and banking service products quality. Broderick and Vachirapornpuk (2002) tracked the member usage patterns over a three-month period based on a participant observation in an internet banking community. The bulletin board enabled discussion episodes on the experiences the participating members made with internet banking. In total, 160 incidents from 55 topic episodes were analyzed. The findings show that the elements with the most immediate impact on service evaluation are cues in the service setting, key events in the service encounters and the level and nature of customer participation. However, the results indicate an aggregated level of research, which makes a precise and testable measurement of service quality in internet banking impossible.

Jayawardhena (2004) transforms the original SERVQUAL scale to the internet context and develops a battery of 21 items to assess service quality in e-banking. By means of an exploratory (EFA) and confirmatory factor analysis (CFA), these 21 items are condensed to five quality dimensions: access, web site interface, trust, attention and credibility. Although 59 per cent of the variance in overall service quality can be explained by the model, affective customer reactions to the service process are not considered. This has to be seen critical as several authors emphasize the importance of hedonic aspects of the electronic service consumption represented by the extent of fun and enjoyment provided by the portal (Dabholkar, 1996; van Riel *et al.*, 2001).

To sum up, the studies discussed above provide important insights into the dimensions and characteristics of service quality in general as well as service quality in e-banking in particular. However, considering e-banking portals as holistic business models, the existing partial measurement models have to be integrated and extended in order to fully capture all relevant dimensions of portal quality.

Developing a quality model for e-banking web portals

Considering the preceding argumentation, we propose that the three-dimensional service concept is still valid for web portals. We denote these three categories of portal services to be core services, additional (supplementary) services and solution services. Consequently, the quality evaluations of these three service components together form the basis for assessing web portal quality. This idea refers to the so-called multi-attributive concept of service quality where the service quality judgement is seen closely related to distinct elements and stages of transactions (Oliver, 1997; Olsen and Johnson, 2003; Parasuraman *et al.*, 1988). This measure is able to capture the complex psychological reactions that consumers have to a service provider's performance (Olsen and Johnson, 2003). In contrast, cumulative quality evaluations represent a customer satisfaction oriented, global construct and can be understood as a consequence of transaction specific quality judgements (Anderson and Lehmann, 1994). Moreover, a multi-attributive quality measurement allows managers to better monitor and facilitate changes in performance. Given the arguments presented

here, portal quality is conceptualized as the extent of perceived performance of the three fundamental service components delivered by a portal. After having defined the general construct dimensions, we will now conceptualize each dimension within the context of e-banking.

The first dimension which meets the basic demands is related to classic bank products such as payment processing (cash management, transfers, viewing bank statements, bill paying) or brokerage (Furst *et al.*, 2002; Jun and Cai, 2001). Furthermore, technical characteristics such as ease of use and speed of data transfer, a clear and consistent web site design and functional navigation constitute core services (van Riel *et al.*, 2001; Yang *et al.*, 2001). In addition, secure payment methods, search facilities and transaction archives can likewise be interpreted as core services (van Riel *et al.*, 2001). Generally speaking, these core products of bank portals are expected to be minimum elements, which reflect the reliability of the service provider and therefore, reduce the perceived risk of using a financial portal site (Gounaris and Dimitriadis, 2003; Zeithaml *et al.*, 2002). They are highly assimilated in competitive markets.

A portal's additional services, which are explicitly demanded by the customer, consist of, e.g. the possibility of obtaining loans online and a selection of branded financial products such as brand funds or insurances (Furst *et al.*, 2002). By transferring the reputation of trusted conventional brands on the web portal, the provider can leverage trust and loyalty on the internet (Srinivasan *et al.*, 2002). In addition, a challenging and entertaining web site design that facilitates flow experience also belongs to the group of additional services (Broderick and Vachirapornpuk, 2002; Csikszentmihalyi, 1988). As several findings suggest, hedonic elements play an important role even for evaluating the quality of professional, information-based web services which are predominant in e-banking (Bauer and Hammerschmidt, 2002; Dabholkar, 1996; Novak *et al.*, 2000).

The problem-solving services form the highest level of portal services reflecting the provider's responsiveness to customer problems and providing a high level of transaction process quality. Responsiveness is assured by tailoring web site elements, products and conditions to customer demands which enhances customer participation in the service delivery process (van Riel *et al.*, 2001). This also includes assuring high availability and accessibility of the portals offerings and providing interactive calculation and decision support tools enabling financial engineering via the internet (Srinivasan *et al.*, 2002). Furthermore, providing virtual community facilities (chats, news groups) to develop customer-to-customer interaction create useful resources in the form of social capital (online advice and exchanging experience of the community members) that users can draw upon (Blanchard and Horan, 1998). These aspects are major prerequisites for guaranteeing superior relationship quality which increase the customers' benefit of long-term relations with the portal provider. Particularly in virtual environments providing high relationship quality is a suitable opportunity to exceed customer expectations, which may lead to increased satisfaction. Thus, relationship-oriented service elements can create competitive advantage in e-banking.

To sum up, utilizing an e-banking portal site can be understood as a complex process consisting of various sub-processes that refer to the use of the described service components. Consequently, we assume that customers evaluate the quality of

each of the three components separately. A customer may perceive a high usability of the navigation and search engines, but evaluates the advice and recommendation services negatively (van Riel *et al.*, 2001). Thus, applying the proposed three-dimensional service concept, we suggest three fundamental quality dimensions of e-banking portals. Each of the three quality dimensions can be captured by means of several quality indicators, exemplarily shown in Table I.

Whether the three quality dimensions actually capture customer perceptions of web portal service quality is empirically tested in the following study.

Empirical validation of a quality measurement model for e-banking portals

Data collection

Based on the conceptualization of the quality dimensions of banking web portals, we developed a set of evaluation criteria (quality indicators) that capture the nature of the three dimensions. With one exception, the few existing empirical studies dealing with quality assessment in e-commerce are mainly concerned with analyzing particular internet functions and resources of specialized web sites (pure play web sites). The relevant aspects of these studies have been discussed in the literature review and have been integrated in our item pool. In view of the scarce literature on e-service quality, we decided to use a large initial item pool. In this way we ensured that no potentially relevant quality determinant was ignored.

The generation of the initial item pool was ascertained by expert interviews at banks and e-business consultancies as well as through in-depth discussions with portal users. Pre-tests of the initial 110-item questionnaire were carried out with 20 online users in order to refine the instrument. The resulting modified 80-item pool was presented to German users of e-banking portals in the course of an online survey. Respondents were asked to refer to their own banking portal (the one they use regularly) when answering the questionnaire. Although the respondents self-selected for the survey, on the basis of control questions like number of online banking transactions per week and internet usage hours per week non-significant questionnaires could be identified. These were not taken into account resulting in 280 fully usable questionnaires. In order to assess the representativeness of the sample, we collected and compared socio-demographic data of the respondents with those reported in an extensive national study of internet users conducted by W3B, one of the leading German market research institutes for interactive media (W3B, 2000). Our comparison revealed a close match between both samples. Table II summarizes the basic demographic characteristics of the respondents as well as the comparison sample.

Methodology

The quality items were measured according to a performance-only scale developed by Cronin and Taylor (1992) with their SERVPERF approach and advocated by Huizingh (2002) for assessing web sites particularly. We assessed the extent to which the participants agreed with performance statements (e.g. "The navigation on the portal is user-friendly and understandable") on a seven-point scale ranging from "completely disagree" to "completely agree". A growing body of literature (Cronin and Taylor, 1992) suggests that the performance-only scale is appropriate for the measurement of quality. This refers to the frequently emphasized fact that respondents do not have to

Quality dimension	Exemplary items	References
Core service quality	Offering a broad and deep range of classic bank products (payment, bonds, stocks) Ease of use Comprehensiveness Credibility/trustworthiness Security of payment and data transfer Reliability of technical potentials/tangibles (IT systems)	Jun and Cai (2001) van Riel <i>et al.</i> (2001) and Meuter <i>et al.</i> (2000) Szymanski and Hise (2000) Santos (2003) and Cox and Dale (2001) Jun and Cai (2001) and Santos (2003) van Riel <i>et al.</i> (2001), Yang <i>et al.</i> (2001) and Zeithaml <i>et al.</i> (2002)
Additional services quality	Offering branded financial products Offering online loans Experience quality and entertainment	Srinivasan <i>et al.</i> (2002) Furst <i>et al.</i> (2002) Broderick and Vachirapornpuk (2002) and Novak <i>et al.</i> (2000)
Solution services quality	Variety Offering non-bank products and services Providing individual advice (call back, personal adviser) and recommendations Personalizing information and conditions Providing interactive decision support tools Offering newsgroups/communities	Bauer and Hammerschmidt (2002) van Riel <i>et al.</i> (2001) Santos (2003), Li <i>et al.</i> (2002) and Srinivasan <i>et al.</i> (2002) Jayawardhena (2004) and Li <i>et al.</i> (2002) Gounaris and Dimitriadis (2003), Jayawardhena (2004) and Zeithaml <i>et al.</i> (2002) Blanchard and Horan (1998)

Table I.
The conceptual
framework for
measuring the quality
of e-banking portals

Table II.
Demographic
characteristics of the
respondents

	Respondents, <i>n</i> = 280 (per cent)	14. W3B-survey <i>n</i> = 94.193 (per cent)
<i>Gender</i>		
Male	72.5	64.9
Female	27.5	35.1
<i>Education</i>		
Low (secondary school)	11	15.1
Middle (high school; apprenticeship)	46	42.2
High (university; polytechnic)	43	42.7
<i>Age</i>		
Up to 20	4	5.9
20-29 years	74	24.7
30-39 years	14	30.6
40 years and older	8	38.8

state their pre-purchase expectations *ex post*, which is required when using a disconfirmation-based scale. Considering e-banking portals as innovative and constantly advancing business models, it seems problematic to administer expectations towards the portal's services from customers every time the portal is used. Moreover, expectations would be heavily influenced by the perceived performance. A second more pragmatic advantage of a performance-based scale lies in its easy handling which minimizes the complexity of the survey. Bearing the explorative nature of our study in mind, which results in a large initial item pool being presented to the respondents reducing the number of questions is an important issue. Thus, despite the information loss compared to a disconfirmation-based scale a performance-based quality assessment seems to be adequate.

Data analysis and results

The empirical validation of the measurement model for portal quality was performed by exploratory and confirmatory factor analyses as well as reliability analyses, following the guidelines of Churchill (1987) and Gerbing and Anderson (1988). This method of construct validation has been widely established in the literature (Baumgartner and Homburg, 1996).

In view of the explorative nature of our study, we first factor analyzed the set of 80 items with the help of principal component analysis to test our *a priori* assumptions about the underlying factor structure. As a result, a total of 18 facets were obtained. We then calculated Cronbach's α for each factor to ensure satisfactory levels of internal consistency and to select the best items for each facet. Scale purification was conducted by eliminating items with high cross loadings and led to a significant reduction in the number of items. A second exploratory factor analysis carried out with the remaining 68 items resulted in the extraction of the same factor structure. We then conducted a factor analysis of second-order (Byrne, 1998), which led to a further reduction of the quality factors to six fundamental quality dimensions. According to the loadings of the factors on the six dimensions, we named the dimensions "security and trust", "basic services", "cross-buying services", "added value", "transaction support" and "responsiveness".

Next, the dimensions were tested for their reliability and validity one by one by means of confirmatory factor analyses with LISREL 8.53 using the unweighted least

squares (ULS) estimator. In order to assure valid construct measurements, the goodness-of-fit index (GFI), the adjusted goodness-of-fit index (AGFI), the average variance extracted (AVE) and chi-square test as overall fit measures were used in the following to evaluate each dimension. In addition to Cronbach's α , the local fit indices – indicator reliability, AVE, factor reliability and total variance explained – were employed to test the validity of the factors and indicators within each dimension (Baumgartner and Homburg, 1996; Churchill, 1987). The corresponding fit measures suggested the elimination of seven indicators to refine the scales, leaving a total of 61 items. The following six tables summarize the results of the scale validation process using the above-named fit indices to develop and validate a measurement instrument for portal quality.

The fit statistics provided in Tables III-VIII suggest a good model fit for all dimensions with most fit measures scoring on or above the cut-off points, which are given in brackets in Table III (Bagozzi and Baumgartner, 1994; Nunnally, 1978). The measurement model therefore, contains a sufficient degree of reliability as well as convergent validity.

In order to correctly check for the convergent validity of the measurement model as a whole, we finally conducted a CFA on all extracted six quality dimensions at the same time. The GFI of 0.95, the AGFI of 0.92 and the root mean square error of approximation (RMSEA) of 0.068 for the overall model suggested a good model fit. Moreover, the overall chi-square test for the entire measurement model was statistically significant on a 0.1 per cent level (χ^2/df ratio = 1.95).

In order to derive a parsimonious measurement model with dimensions that are mutually exclusive in their meaning, an assessment of the discriminant validity is required in addition to testing the convergent validity. Discriminant validity is given when AVE for each construct (Tables III-VIII), reflecting the intra-dimensional interrelations, is greater than the squared correlation between that dimension and any other dimension, reflecting the inter-dimensional interrelations (Fornell and Larcker, 1981). With exception of the correlation shown in Table IX, the results indicate a high degree of discriminant validity.

The structure of the final measurement instrument (including 61 items) is shown in Figure 1. It is set up hierarchically with six fundamental quality dimensions arranged on the uppermost level. They are represented as a rectangle and formed by the 18 quality factors (sub-dimensions) on the level just below. Each factor is measured by

Factor	Final scale items	Indicator reliability (> 0.4)	Cronbach's α (> 0.7)	AVE (> 0.4)	Factor reliability (> 0.5)	Total variance explained (> 60)
Security	Secure payment system	0.50	0.57	0.40	0.57	73.0
	Data/transfer security	0.36				
Trust-worthiness	Reliability of quotes and prices	0.36	0.59	0.31	0.57	53.0
	Understandability	0.36				
	Discretion	0.60				

Note: GFI (> 0.9): 0.99, AGFI (> 0.9): 0.97, AVE (> 0.4): 0.46, Chi-square measure (< 3): 0.56

Table III.
The "security and trust"
dimension

Table IV.
The “basic services
quality” dimension

Factor	Scale items	Indicator reliability	Cronbach's α	AVE	Factor reliability	Total variance explained
Choice	Breadth of service range	0.50	0.81	0.71	0.83	0.67
	Depth of service range	0.90				
Conditions of basic services	Services from outside providers	0.49	0.72	0.52	0.80	0.64
	Payment transaction conditions	0.28				
	Conditions of securities	0.74				
	Funds purchase conditions	0.58				
Payment transactions	Breadth of services	0.62	0.87	0.78	0.88	0.67
	Possibility of opening accounts online	0.94				

Note: GFI: 0.96, AGFI: 0.91, AVE: 0.40, Chi-square measure: 2.0

Factor	Scale items	Indicator reliability	Cronbach's α	AVE	Factor reliability	Total variance explained
Online loans	Loans through other providers	0.54	0.80	0.53	0.82	0.71
	Mortgaging securities portfolio	0.62				
	Fast loan grants	0.55				
All-in finance products	Loan conditions	0.43	0.81	0.56	0.84	0.61
	Choice of competitive all-in finance products	0.67				
	Brand name all-in finance products	0.64				
	Brand name funds	0.47				
	Depth of performance	0.48				
Note: GFI: 0.97, AGFI: 0.94, AVE: 0.57, Chi-square measure: 2.4						

Table V.
The “cross-buying
services quality”
dimension

Factor	Final scale items	Indicator reliability	Cronbach's α	AVE	Factor reliability	Total variance explained
Enjoyment and entertainment	Visual appeal (graphics, pictures)	0.60	0.83	0.58	0.85	0.62
	Animation	0.61				
	Multimedia elements	0.63				
	Exciting site design	0.46				
Non-bank services	Airline timetables/travel service	0.69	0.89	0.67	0.89	0.73
	Rental car reservation	0.73				
	Car purchasing	0.63				
	Online shop	0.64				

Note: GFI: 0.99, AGFI: 0.98, AVE: 0.40, Chi-square measure: 0.9

Factor	Final scale items	Indicator reliability	Cronbach's α	AVE	Factor reliability	Total variance explained
Convenience of transaction processing	Flexibility	0.36	0.66	0.43	0.69	0.57
	Easy access to information	0.33				
	Simplicity of order placement	0.56				
Interactivity	Easy transaction completion	0.41	0.64	0.38	0.64	0.57
	Plausibility check	0.41				
	Direct help/tutorials	0.49				
Information provision	Confirmation of execution	0.24	0.84	0.57	0.84	0.69
	General information	0.45				
	Information about special interests	0.44				
	Actuality of personal information	0.71				
	Actuality of general information	0.66				
Decision support	Newsletter	0.32	0.64	0.31	0.63	0.58
	Reference to personally relevant services	0.23				
	Reference to special conditions	0.31				
	Interactive calculation and comparison tools	0.36				
Customer care	Friendliness	0.34	0.77	0.46	0.77	0.53
	Speed	0.45				
	Prompt connection to contact person	0.51				
	Competence	0.57				
	Availability via e-mail	0.25				
Note: GFI: 0.99, AGFI: 0.98, AVE: 0.44, Chi-square measure: 2.5						

Table VII.
The “transaction support” dimension

Factor	Scale items	Indicator reliability	Cronbach's α	AVE	Factor reliability	Total variance explained
Availability and accessibility	Hotline	0.17	0.63	0.54	0.82	0.55
	Call back button	0.71				
	No service breakdown (24/7)	0.62	0.77	0.34	0.70	0.69
	Promptness and accuracy of response	0.69				
Personalization	Individually tailored services	0.22				
	Individual conditions	0.21	0.13	0.51	0.67	0.83
	Individual investment tips	0.13				
	News field	0.55				
Community	Information on personal interests	0.61	0.79	0.51	0.67	0.83
	Chat rooms	0.53				
	News groups	0.48				
Complaint management	Separate device for handling complaints	1.00	–	–	–	–

Note: GFI: 0.97, AGFI: 0.96, AVE: 0.35, Chi-square measure: 2.8

a multiple-item scale shown in Tables III-VIII. On the first sight, the dimensionality of the portal quality construct seems to be different to the one proposed. However, considering the categorization of service elements resulting from the conceptualization it seems reasonable to classify the identified dimensions into the three service categories core services, additional services and problem-solving services (Figure 1). This conclusion is supported by Akaike's information criterion (AIC), a well-accepted criterion for the selection of measurement models (Akaike, 1974), which was applied to all possible pairwise combinations of the six quality dimensions. The three pairs of dimensions shown in Figure 1 exhibit the lowest AIC values suggesting the assignment of the six dimensions in the way described above.

In conclusion, the statistical results presented so far led us to infer that the model shown in Figure 1 is the best operationalization of the portal quality construct.

Implications for the quality management of e-banking portals

It is important to note that, obviously, the criteria portal users perceive to be essential for an assessment of quality can be reduced to a small number of fundamental dimensions. The empirical results provide a reliable, valid, and generalizable scale to measure the quality of bank portals that can be easily applied in management. Figure 1 as well as the items shown in Tables III-VIII illustrate how portal quality dimensions can be managed in order to improve the total quality of the portal. Figure 1 shows the factors that make up the quality dimensions. The tables contain information about which distinct indicators measure the factors and to what extent. The latter information results from the indicator reliabilities that represent the squared factor loadings. The higher the factor loading of an indicator, the higher is the importance of that indicator for the respective quality factor, which provides useful implications for quality management.

In the following, we will focus on essential results that are primarily important concerning managerial issues.

Within the first dimension the factor "security" is predominantly related to the quality of the online system, "trustworthiness" is mainly dependent on the reliability and credibility of the provider. A particularly strong feeling of security can apparently be conveyed through guaranteeing higher reliability during electronic money transactions (e.g. payment, transfers, and debits). Trustworthiness can be intensively promoted through a high level of discretion. Therefore, customer data should neither be sold to competitors nor should it be evaluated for market research purposes without the customer's consent or knowledge.

As Table IV shows, bank portal's quality is strongly associated with possibility to access a wide range of choices of financial products and features. Moreover, the

	AVE	Dimension 1 0.46	Dimension 2 0.40	Dimension 3 0.57	Dimension 4 0.40	Dimension 5 0.44	Dimension 6 0.35
Dimension 2	0.40	0.09	squared multiple correlations between the dimensions				
Dimension 3	0.57	0.01	0.09				
Dimension 4	0.40	0.01	0.02	0.12			
Dimension 5	0.44	0.43	0.23	0.14	0.05		
Dimension 6	0.35	0.15	0.05	0.20	0.24	0.49	

Table IX.
Fornell-Larcker criterion

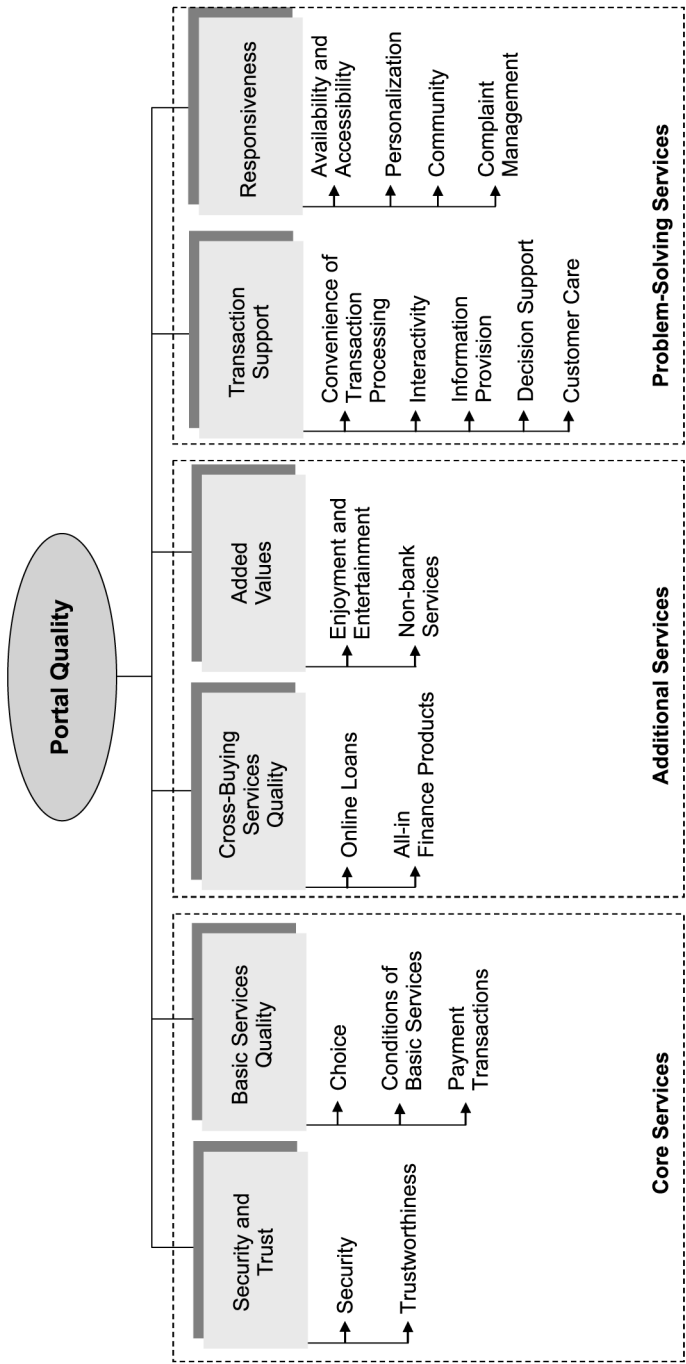


Figure 1.
The validated
measurement model of
portal quality

assessment of basic service conditions is determined by the item “availability of services from outside providers”. The portal’s conditions are evaluated more favourable if a variety of competitive financial services is offered. This can be attributed to the fact that the choice of cheap or less expensive products becomes available due to higher competitive pressure.

The range of cross-buying services represents an independent dimension for the assessment of a portal. Subsequently, an e-banking portal’s attractiveness depends on whether complementary e-banking services apart from the traditional bank products (e.g. insurances, construction financing and private retirement saving schemes) are available, which facilitates one-stop banking. Cross-buying services are a prerequisite for turning a portal into an integral problem solver. The expansion of demand from the initial core products (payment transaction processing and security purchasing) to near-bank products facilitates the extension and intensification of customer relations. Having unlimited access to a wide array of competitive products represents a further quality attribute.

The results show that the factor “enjoyment and entertainment” within the added value dimension is a relevant criterion for assessing the quality of bank portals. This result closely corresponds with and can easily be explained by findings derived from the flow theory (Csikszentmihalyi, 1988; Hoffman and Novak, 1996). Since internet users tend to enjoy exploring new technologies, the provision of entertainment and fun elements can create a flow experience (i.e. a state of emotional activation that can be described as enjoyment and absorption of attention) when using the web site. Providing a flow experience increases user loyalty and the duration of site visits. In order to achieve this goal and to generate excitement and a feeling of joy in experimentation, a challenging and sophisticated portal design is necessary (Hoffman and Novak, 1996). Our findings prove that hedonic effects even play an important role in evaluating the quality of professional, information-based web services, which are predominant in internet banking.

“Customer care” as a part of the transaction support dimension represents an aspect that is of crucial importance for e-banking portals. The “advice-free banking principal” (“click or brick”) that is consistently claimed in internet can therefore, not be applied in this context. Evidently, the customer also demands access to advice and help in a conventional manner when conducting online banking (“click and brick”). The effective synchronization of online and off-line business, which is identified as a key success factor by Mahajan *et al.* (2002), is also a crucial aspect for the portal’s assessment from the customer’s point of view.

The ability to personalize portal services and functions – an evaluation criterion captured within the sixth dimension responsiveness – is still not utilized by all service providers and therefore, represents a means to gain competitive advantages. Through the ability to personalize, heterogeneous user needs can be met through one portal site. Only through this process it is possible for the customer to obtain individually tailored products and content and to be able to actively control the design of the portal’s functions and content (“build your own bank” principle). This accounts for the portal’s high bonding effect that is not only reflected in lasting business relationships but also in long portal visits.

Conclusion and suggestions for future research

As the empirical findings of our study indicate, we have to withdraw from the idea of an universal perception of service quality in the internet. Instead, the assumption of varying quality dimensions across industries and settings (Gounaris and Dimitriadis, 2003) is confirmed. In the case of e-banking portals six main quality dimensions related to three generic service categories were identified: security/trustworthiness and basic services represent the basic demands of portal users and form the core service category. Attractive cross-buying services and added value constitute a second dimension representing the additional services that facilitate the use of the core products. A third dimension used for quality assessment consists of transaction support and responsiveness of the service provider which are assured by personalized offers and content as well as interactive decision tools.

Consequently, e-banking portal quality cannot be described as a one-dimensional customer rating. Instead, it represents a multi-dimensional and multi-factor construct that is composed of partial quality judgments with regard to the portal's diverse service categories. Our study provides validated measurement scales for each factor. The empirical results strongly support the understanding of portals as integral solutions. Portals represent a bundle of various services and functions. Based on our findings, management can establish early warning systems by continuously measuring quality in e-banking and can foster appropriate improvements as soon as one of the dimensions falls below a tolerable level. Thus, aspects as for example depth of service range and possibility of opening accounts online or call back buttons and prompt responses to questions are important drivers leveraging overall service quality in an effective manner.

The major limitation of the present study can be seen in the fact that participants selected their own web portal for answering the questionnaire. Thus, various different banking portals were examined. Consequently, validity can be improved by collecting data from randomly selected users of pre-specified portal sites via mail surveys.

Furthermore, future research could be concerned with analyzing whether the identified measurement model can be generalized and applied to other portals types than e-banking portals. Second, the relationship between the extracted quality dimensions and customer satisfaction or loyalty, respectively, requires further investigation. Finally, comparing our e-service quality model with traditional service quality models may provide more detailed insights into the field of quality perceptions.

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The quality of
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